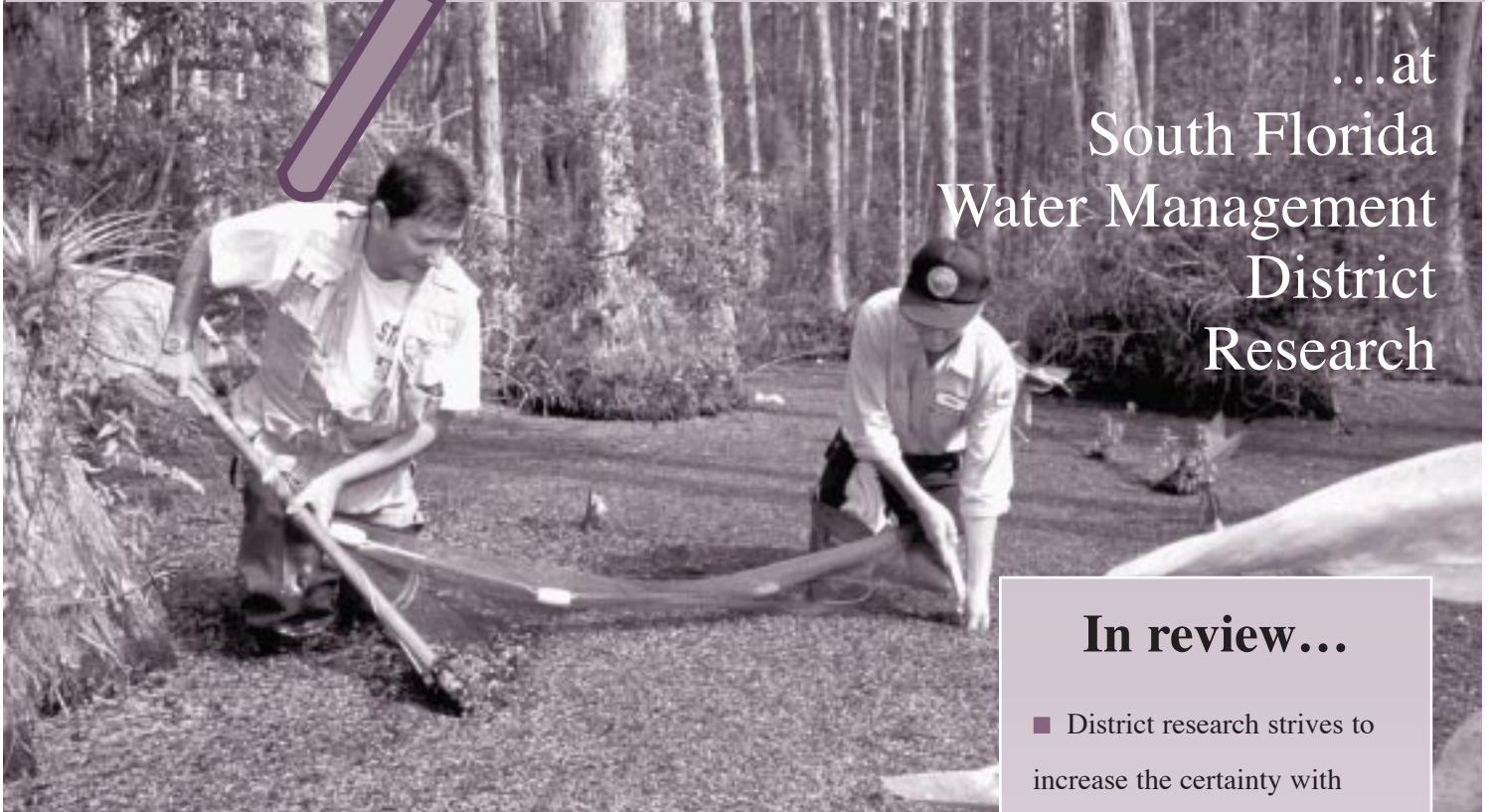


# A CLOSER LOOK



...at  
South Florida  
Water Management  
District  
Research

*District scientists conduct field and laboratory experimental research, data collection and modeling to gain a better understanding of how south Florida's ecosystems function.*

## **The influence of people on nature is the reason for restoration**

South Florida's aquatic ecosystems extend from the headwaters of the Kissimmee River to Florida Bay and include a diverse array of riverine, lake, wetland and estuarine habitats. These are precious natural resources that have been severely impacted by human actions since the late 19th century. Humans have polluted the surface waters with nutrients and other wastes from agricultural and urban areas, dramatically changed the natural hydrologic regimes and introduced exotic plants that have taken over large areas once occupied by native plant communities.

Today, scientists and engineers at

the South Florida Water Management District (hereafter referred to as the District), in cooperation with other state and federal agencies, are addressing these pressing environmental issues. The job of these researchers is to increase the certainty with which resource management decisions are made. Their long-term goal is to restore natural ecosystems, without sacrificing the flood control, water supply and recreational benefits that are necessary for the growing regional population.

## **Research and modeling monitor ecosystem health**

The ecosystems that the District is attempting to restore are highly com-

## **In review...**

- District research strives to increase the certainty with which resource management decisions are made.
- The research program is organized by geographic region and includes multidisciplinary teams of scientists and engineers.
- District research topics focus on the impacts of increased nutrients, altered hydroperiods and exotic plant expansion.

plex. As is the case with human medicine, the ability to develop and implement a successful cure depends on an accurate diagnosis, a solid understanding of how

quantify ecosystem structure and function as well as long-term ecological evaluation programs to track restoration progress.

The mission of the

District's research program is to conduct rigorous scientific research and modeling to develop a predictive understanding of south Florida aquatic ecosystems. The results of this research provide decision makers with information that allows them to make wise decisions about ecosystem restoration, with the greatest practical level of

responsible for actual implementation of restoration, water supply and flood control projects.

Several major issues are common to the research being conducted by District staff, regardless of geographic region. These issues include nutrient impacts, altered hydroperiods and exotic (non-native) plants.

### Nutrient impacts

Large regions of the south Florida landscape have been converted to agriculture and urban uses, and nutrient runoff from those lands impacts downstream ecosystems. Impacts have ranged from algal blooms in Lake Okeechobee and Florida Bay to rapid expansions of cattail in Everglades Water Conservation Areas.

To address the nutrient issue, research staff perform controlled experiments, modeling and short- and long-term observational studies. The research has included (a) experimental studies to identify agricultural best management practices and innovative water treatment technologies; (b) development of Geographic Information Systems (GIS)-



*District biologists process fish samples from the channelized Kissimmee River. Baseline (pre-restoration) data on existing fish communities will provide a key benchmark for gauging the success of the restoration project in reestablishing high quality natural resources in the river system.*

the patient's system functions and close monitoring of responses to treatment. Scientists study aquatic ecosystems in a very similar manner, performing experimental research, process measurements and modeling to

certainty.

### Here's how the research team works

The research program is organized by geographic region and includes multi-disciplinary teams of scientists and engineers who study the Kissimmee River, Lake Okeechobee, east and west coast estuaries, Everglades and Florida Bay. There is close cooperation among these groups, because research topics and management issues cross geographic boundaries. The research program supports the District's planning, regulation and restoration construction programs. This organizational structure facilitates an information exchange among the scientists and engineers who are conducting research and those



*An environmental scientist measures changes in water quality at the Everglades Nutrient Removal (ENR) project. The ENR is a 3,800-acre constructed wetland, located northwest of Water Conservation Area 1, and is the prototype for the Stormwater Treatment Areas (STAs). Understanding how water quality improvements occur in the ENR will assist in the optimization of STA performance.*

The job of these researchers is to increase the certainty with which resource management decisions are made.

based models that can be used to predict how changes in land use will affect nutrient runoff; (c) experimental research to establish threshold nutrient levels that will prevent unnatural changes in plant and animal communities;





trolling the spread of torpedo grass. Because changes in hydrology have the potential to affect the balance between exotic and native plants, scientists also are conducting research to evaluate hydroperiod requirements of

Exotic plants such as hydrilla, melaleuca and torpedo grass have expanded across large portions of south Florida's aquatic ecosystems. These plants displace native vegetation and degrade the quality of the habitat for fish and wildlife.

torpedo grass, melaleuca and several native plant species including sawgrass and spike rush. This information will allow more accurate predictions of how management actions may affect the plant communities and help guide restoration efforts.

### Research program follows several key principles

To ensure that research provides a maximum amount of useful information for regional restoration, several key principles are followed. Collectively, these define the operating philosophy of the research program and

are summarized here.

- Research efforts focus on critical management issues, as described above, and major results are communicated quickly to decision makers to guide management actions. This linkage requires close communication between researchers and users of the information.

- Scientific products are scrutinized by scientists outside the District to ensure that research is of the highest quality. This scrutiny is accomplished by submitting research products as publications to peer-reviewed scientific journals, where unbiased, anonymous reviews are conducted by leading experts in the field.

- Research utilizes a variety of scientific approaches. Observational studies permit an evaluation of patterns across time and space in the landscape including responses to human stressors and restoration initiatives. Computer models integrate research results and serve as a framework for predicting complex ecosystem responses to human and natural forces.



*Freshwater flows from the Everglades to Florida Bay through mangrove forests. Here, researchers deploy water sampling equipment in a mangrove forest creek to determine how changing freshwater flow affects water quality in the bay.*

exotic plant expansion requires cooperative work by plant ecologists, hydrologists and GIS modelers.

Rigorous scientific research, focused on critical resource management issues, is the primary goal of the interdisciplinary team of scientists and engineers who collectively comprise the District's research program. Working together with decision makers, the information District scientists and engineers provide will result in a brighter future for south Florida's valuable natural ecosystems.



*Submerged grass beds provide critical habitat for estuarine fish and shellfish. At the FAU Gumbo Limbo Research Center in Boca Raton, District scientists grow these grasses under controlled conditions to determine the effects of salinity on their growth and survival. Results will help the District improve its management of freshwater discharge to south Florida's estuaries.*

Experimental studies are used to establish cause-and-effect relationships.

- Research often must cross traditional disciplinary and geographic boundaries. For example, the optimal approach for understanding and ultimately controlling



For more information on District Research, please contact the SFWMD at (561) 686-8800.

For news on other SFWMD research projects, please see the following *Closer Look* publications:

- ESTUARY RESEARCH
- EVERGLADES RESEARCH
- KISSIMMEE RIVER RESEARCH
- LAKE OKEECHOBEE RESEARCH
- SOUTHERN EVERGLADES AND FLORIDA BAY RESEARCH
- STORMWATER TREATMENT AND SUPPLEMENTAL TECHNOLOGY RESEARCH

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